

WHAT IS CLAIMED IS:

1. A holographic laser comprising:
 - a first light source for emitting a light beam L1 of a first wavelength toward an optical disk;
 - a second light source for emitting a light beam L2 of a second wavelength different from the first wavelength toward an optical disk;
 - a wavelength separating element for separating the light beam L1 and the light beam L2 reflected by the respective optical disks;
 - a first holographic element for converging the light beam L1 separated by the wavelength separating element;
 - a second holographic element for converging the light beam L2 separated by the wavelength separating element; and
 - a light receiving element for receiving the light beam L1 converged by the first holographic element and the light beam L2 converged by the second holographic element,
wherein the light receiving element is positioned between a focal position of 0th order diffracted light of the first holographic element and a focal position of 0th order diffracted light of the second holographic element; and
wherein the first light source, the second light source, the wavelength separating element, the first holographic element, and the second holographic element are integrally formed into a single component.

2. The holographic laser of claim 1, wherein directions of diffraction of the first holographic element and the second holographic element are substantially parallel to an alignment direction of the first holographic element and the second holographic element.

3. The holographic laser of claim 1, wherein an alignment direction of the first light source and the second light source is substantially parallel to an alignment direction of the first holographic element and the second holographic element.

4. The holographic laser of claim 1, wherein the first holographic element and the second holographic element have a substantially equal grating pitch.

5. The holographic laser of claim 1, wherein the first holographic element and the second holographic element have a plurality of small gratings which are divided into a plurality of regions, and

grating pitches of the small gratings on the same holographic element are substantially equal.

6. The holographic laser of claim 1, wherein the light receiving element is positioned so as to be closer to the focal

position of 0th order diffracted light from the holographic element which converges light of the shorter wavelength of the light beam L1 and the light beam L2 than to the focal position of 0th order diffracted light from the holographic element which converges light of the longer wavelength of the light beam L1 and the light beam L2.

7. The holographic laser of claim 5, wherein the light receiving element has a plurality of light receiving regions for receiving light diffracted by the small gratings of the first holographic element and the second holographic element,

a first light receiving region of the light receiving regions detects diffracted light including RF signals of a compact disk and diffracted light including RF signals of a digital versatile disk, and

a second light receiving region of the light receiving regions detects diffracted light including RF signals of a compact disk and diffracted light including phase difference signals of a digital versatile disk.

8. The holographic laser of claim 7, wherein a shape of the second light receiving region is that of two intersecting parallelograms extending along directions of diffraction of the holographic elements, wherein one of four corners of one of the parallelograms exists within the other parallelogram.

9. The holographic laser of claim 7, wherein the plurality of light receiving regions are aligned perpendicular to an alignment direction of the first holographic element and the second holographic element.

10. A holographic laser comprising:

a first light source for emitting a light beam L1 of a first wavelength toward an optical disk;

a second light source for emitting a light beam L2 of a second wavelength different from the first wavelength toward an optical disk;

a wavelength separating element for separating the light beam L1 and the light beam L2 reflected by the respective optical disks;

a first holographic element for converging the light beam L1 separated by the wavelength separating element;

a second holographic element for converging the light beam L2 separated by the wavelength separating element; and

a light receiving element for receiving the light beam L1 converged by the first holographic element and the light beam L2 converged by the second holographic element,

wherein the second holographic element, the first holographic element, and the wavelength separating element are arranged in this order in a direction in which the light beam

L1 and the light beam L2 are emitted from the first and second light sources toward the respective optical disks,

wherein the light receiving element is arranged so as to be located between a couple of the focal positions of the 0th order diffracted light of the first and second holographic elements and a couple of the first and second light sources on a virtual plane perpendicular to an optical axis of the light beam L1 or light beam L2 emitted toward the optical disk from the first or second light source onto which plane the light receiving element is projected, and

wherein the first light source, the second light source, the wavelength separating element, the first holographic element, and the second holographic element are formed integrally into a single component.

11. A holographic laser comprising:

a first light source for emitting a light beam L1 of a first wavelength toward an optical disk;

a second light source for emitting a light beam L2 of a second wavelength different from the first wavelength toward an optical disk;

first and second wavelength separating elements for respectively separating the light beam L1 and the light beam L2 reflected by the respective optical disks;

a first holographic element for converging the light beam

L1 separated by the first wavelength separating element;
a second holographic element for converging the light beam
L2 separated by the second wavelength separating element; and
a light receiving element for receiving the light beam
L1 converged by the first holographic element and the light beam
L2 converged by the second holographic element;
wherein the first holographic element, the first
wavelength separating element, the second holographic element,
and the second wavelength separating element are arranged in
this order in a direction in which the light beam L1 and the
light beam L2 are emitted from the first and second light sources
toward the respective optical disks;
wherein the light receiving element is positioned between
a focal position of 0th order diffracted light of the first
holographic element and a focal position of 0th order diffracted
light of the second holographic element; and
wherein the first light source, the second light source,
the first wavelength separating element, the second wavelength
separating element, the first holographic element, and the second
holographic element are formed integrally into a single
component.

12. The holographic laser of claim 10, wherein holograms formed
in the first and second holographic elements are positioned away
from light paths formed by the light beam L1 and the light beam

L2 from the first and second light sources to the optical disk.

13. The holographic laser of claim 11, wherein holograms formed in the first and second holographic elements are positioned away from light paths formed by the light beam L1 and the light beam L2 from the first and second light sources to the optical disk.

14. The holographic laser of claim 10, wherein the light beam L1 and the light beam L2 have different wavelengths, and the wavelength separating element separates the wavelengths of both the light beam L1 and the light beam L2.

15. The holographic laser of claim 11, wherein the light beam L1 and the light beam L2 have different wavelengths, and the first wavelength separating element separates only the light beam L1 wavelength, and the second wavelength separating element separates only the light beam L2 wavelength.

16. The holographic laser of claim 10, wherein the hologram formed in the first holographic element and the hologram formed in the second holographic element are positioned such that plus first-order diffracted light of the light beam L1 diffracted by the hologram formed in the first holographic element does not pass through the hologram formed in the second holographic element.

17. The holographic laser of claim 10, wherein the hologram formed in the first holographic element and the hologram formed in the second holographic element are positioned such that all of the light beam L2 passes through the hologram formed in the first holographic element and is incident on the hologram formed in the second holographic element.

18. The holographic laser of claim 10, wherein a hologram formed in the first holographic element and a hologram formed in the second holographic element are positioned such that all of the light beam L2 that passes through the hologram formed in the first holographic element also passes through the hologram formed in the second holographic element; and

the hologram formed in the second holographic element and the light receiving element are positioned such that neither plus first nor minus first order diffracted light that is diffracted by the hologram formed in the second holographic element is incident on the light receiving element.

19. An optical laser pickup comprising:

the holographic laser of claim 1; and
an optical system for guiding light emitted from the holographic laser to an optical disk and guiding light reflected from the optical disk to the holographic laser.

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20. An optical laser pickup comprising:
the holographic laser of claim 10; and
an optical system for guiding light emitted from the
holographic laser to an optical disk and guiding light reflected
from the optical disk to the holographic laser.
21. An optical laser pickup comprising:
the holographic laser of claim 11; and
an optical system for guiding light emitted from the
holographic laser to an optical disk and guiding light reflected
from the optical disk to the holographic laser.